REMARKS

Herein, the "Action" or "Office Action" refers to the Office Action dated April 16, 2004.

Applicant respectfully requests reconsideration and allowance of all of the claims of the application. Claims 1-35, 37-40, and 42-56 are presently pending. Claims amended herein are 1-6, 13, 19-24, 27, 28, 30, 37, 42-45, and 46-52. Claims withdrawn or cancelled herein are none. New claims are added herein are 53-56.

Telephone Interview (9/9/2004)

Attorney for Applicant, Kasey Christie, appreciates the opportunity to talk to Examiner Quang Nguyen during a telephone interview on 9/9/2004. The primary focus of those talks was on how the combination **Lai** and **Bharali** references did not obviate the claims of this Application. In particular, Applicant noted that, without using the claims and teachings of this Application as a roadmap, one of ordinary skill in the art would not be motivated to combine the teachings of these reference. That point is discussed in more detail below.

Amendments

As a result of that telephone discussion with the Examiner, the Applicant amends independent claims 1, 13, 19, 30, 43, 44, 46, 51, and 52 so that they specifically recite operation within the context of a "dynamic network" (e.g., the Internet) and the definition of such a network. That definition is derived from p. 10, lines 20-23 of the Application.

lee&hayes
Lee & Hayes plic, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

This amendment is indented to further strengthen Applicant's position that one of ordinary skill would not be motivated to combine the references (**Lai** and **Bharali**) and to further distinguish these claims from the references.

All other amendments to the claims are indented to resolve existing grammatical issues or resolve new grammatical issues created by the amendment to include recitation of a "dynamic network."

Substantive Claim Rejections

Claim Rejections under §103

The Office rejects all pending claims under §103. For the reasons set forth below, the Office has not made out a *prima facie* case of obviousness (i.e., §103). Accordingly, Applicant respectfully requests that the rejections be withdrawn and the case be passed along to issuance.

The Office's rejections are based upon the following reference:

- **Lai**: *Lai and Baker*, "Measuring Bandwidth" (0-7803-5417-6/99) IEEE 1999;
- **Bharali**: *Bharali et al.*, US Patent No. 6,216,163;
- **Takagi**: *Takagi et al.*, US Patent No. 6,272,148;
- **Lawrence**: *Lawrence*, US Patent No. 6,054,943;
- **Kikuchi**: *Kikuchi et al.*, US Patent No. 6,614,763;
- **Nishigami**: *Nishigami et al.*, US Patent No. 5,890,010;
- **TAPI 3.0**: *Microsoft*, White Paper on "TAPI 3.0 Connection and Media Services (1999);

Lee & Hayes plic, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

- **Hosoi**: *Hosoi et al.*, US Patent No. 6,120,149;
- **Lanzer**: *Lanzer et al.*, US Patent No. 6,005,621;
- **Ranganathan**: *Ranganathan et al.*, US Patent No. 5,921,961;
- **Muuss:** "The Story of the PING program", *http://ftp.arl.mil/~mike/ping.html.*

Overview of the Application

The Application describes techniques directed towards the fast dynamic measurement of connection bandwidth between two entities on a dynamic network. A dynamic network is a communications network where there is no assurance that both packets of a pair of identical packets are handled in an identical manner while in transit on the communications network.

The described measurement techniques utilizes a single pair of packets (i.e., a "Packet-Pair") to calculate bandwidth between two entities on a network. This calculation is based upon the Packet-Pair technique.

On its journey across a dynamic network (e.g., the Internet), a packet may be compressed by communication equipment and modems. This compression shrinks the size of the packet; thus, it can distort the bandwidth calculation using such a shrunken packet. To avoid this distortion, the techniques described in the Application employ non-compressible packets. Therefore, a packet cannot be compressed during its journey.

In addition, on its journey across a dynamic network, packets may be rerouted, delayed, misrouted, and the like. These momentary delays may result in a momentary incorrect bandwidth calculation. This problem is ameliorated by using a history list at the client that keeps track of recent measurements. The

Lee & Hayes pllc, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

client returns the median of that list to the server. That median is the specified bandwidth.

Cited References

The Office cites **Lai** as its primary reference in all of its obviousness rejections. The Office cites either **Bharali** or **Muuss** as its secondary reference in its obviousness rejections.

Lai

Lai describes a few of the conventional bandwidth measurement techniques. Amongst those described is the Packet-Pair technique. See section IV-B "Packet-Pair" on pp. 238-239 of **Lai**.

Lai explains many of the problems with these conventional techniques. With Packet-Pair, for example, **Lai** explains (at p. 236, lines 8-12 of last full ¶ of col. 2) that Packet-Pair technique is not a robust and practical approach used on a typical public network (such as the Internet). A typical public network is a dynamic network.

Lai never discusses or addresses the topic of compression of the packets involved in the Packet-Pair technique. Instead, it focuses on what it calls "time compression" or "time extension" of the two packets of the pair. These terms do not refer to data compression. Rather, they refer to the time delay between packets. See Fig. 1 and the ¶ that begins at the bottom of col. 2 of p. 238 and ends at col. 1 of p. 239.

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421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

Bharali

Bharali describes techniques for providing visualization of performance of a distributed network. Its user interfaces allows easy visualization of the network's performance. Its describes a techniques for determining the distance from a client to a server in the network, for determining a service provider domain, for determining network congestion level, for determining bottleneck throughput, for determining bottleneck location, for determining page retrieval time, and for automatically restarting a page under predetermined conditions.

Within the context of discussing measurements of throughput and congestion level of a network, **Bharali** says the following (col. 8, lines 33-37):

> As one important feature of the invention, in the described method, the packet types are chosen to be non-compressible. Use of compressible packets may lead to unpredictable results and, for this reason, has not been chosen in the described embodiment.

Curiously, **Bharali** fails to elaborate, discuss, or even mention the use of non-compressible packets before or after the above quoted paragraph. **Bharali** says that it is important, but fails to explain why. It says that "use of compressible packets may lead to unpredictable results" but it fails to explain why that might be so.

Furthermore, **Bharali** does not use, mention, teach, describe, or reference the Packet-Pair technique for measuring bandwidth.

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Lee & Hayes plic, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

Muuss

As told by its author, Mike Muuss, this reference tells the story of the history of the development of the "ping" utility. The Ping utility is essentially a system administrator's tool that is used to see if a computer is operating and also to see if network connections are intact. Ping uses the Internet Control Message Protocol (ICMP) Echo function which is detailed in RFC 792.

The Ping utility was created by Mike Muuss (pronounced "moose") of the Army Research Laboratory in December of 1983 in about a day in response to network difficulties he encountered.

Obviousness Rejections

Lack of *Prima Facie* Case of Obviousness (MPEP § 2142)

Applicant disagrees with the Office's obviousness rejections. Arguments presented herein point to various aspects of the record to demonstrate that all of the criteria set forth for making a *prima facie* case have not been met.

Based upon Lai and Bharali

The Office rejects claims 1, 6, 11-14, 19, 24, 28-31, 36, 43, 44, 46, 51, and 52 under USC § 103(a) as being unpatentable over **Lai** and **Bharali**. Applicant respectfully traverses the rejections of these claims. Based on the reasons given below, Applicant asks the Office to withdraw its rejection of these claims.

Lee & Hayes plic, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

No Motivation to Combine References

Applicant asserts that there is no motivation to combine the teachings of **Lai** and the teachings of **Bharali**.

Lai describes conventional bandwidth measurement techniques, including the Packet-Pair technique. **Lai** explains (at p. 236, lines 8-12 of last full ¶ of col. 2) that the Packet-Pair technique is not a robust and practical approach used on a typical public network (e.g., the Internet).

On their journey across a typical public network, packets of a pair of such packets may handled in an different manner while in transit. For example, one packet may be compressed and the other not; they may be compressed differently; they may be routed differently from each other; one may be delayed and the other not. Therefore, the typical public network (e.g., the Internet) described by **Lai** is a "dynamic network" as recited by the claims of the Application.

In its rejections, the Office relies on the **Lai's** discussion of the Packet-Pair technique as showing the use of a first and/or a second packet for measuring bandwidth.

Bharali describes techniques for providing visualization of performance of a typical distributed network, such as the Internet. See "Field of the Invention" section, col. 1, lines 37-41. So, it appears that Bharli does disclose performance measurements over a "dynamic network."

At col. 8, lines 33-37, **Bharali** indicates that it chooses non-compressible packet-types because the use of "compressible packets may lead to unpredictable results."

However, **Bharali** fails to elaborate, discuss, or even mention the use of non-compressible packets before or after col. 8, lines 33-37. **Bharali** says that it is

Lee & Hayes plic, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

important, but fails to explain why. It says that "use of compressible packets may lead to unpredictable results" but it fails to explain why that might be so or to what such unpredictability might relate. Specifically, there is absolutely no suggestion that compressible packets might affect bandwidth measurements such as the Packet-Pair technique.

In other words, **Lai** states that the Packet-Pair technique is impractical over a "dynamic network" as recited by the claims of the Application. While **Bharali** does include performance measurements in a dynamic network, it fails to provide any suggestion that Packet-Pair technique could be improved by using non-compressible packets. This is in part because **Bharali** does not even mention the Packet-Pair technique, and also because **Bharali** does not elaborate on any particular advantage of using non-compressible packets.

Thus, there is nothing in **Bharali** that would suggest the use of non-compressible packets in conjunction with the Packet-Pair technique in the context of a "dynamic network" as recited by the claims of the Application.

Accordingly, Applicant submits that one of ordinary skill would not be motivated to combine the Packet-Pair technique of **Lai** with the "non-compressible" packets of **Bharali**, where **Bharali** fails to disclose the use of the Packet-Pair technique within the context of a "dynamic network" or any factual reasons why "non-compressible" packets are desirable.

Claims 1, 13, 19, 30, 43, 44, 46, 51 and 52

The Office does not tie specific language of these claims to any specific cited portion of the reference. Instead, without linkage to any particular claim

Lee & Hayes plic, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

language, the Office discusses the cited references and cites portions of the references to support its discussion and conclusion. The portions cited by the Office include the following:

- **Lai**, section IV, B, pages 238-239;
- **Lai**, Fig. 1;
- **Bharali**, col. 8, lines 12-13 and 15-17.

Claim 1 recites:

via a dynamic network, receiving at least a pair of non-compressible packets having measurable characteristics, the dynamic network being a communications network having no assurance that both packets of a pair of identical packets are handled in an identical manner while in transit on the communications network;

calculating bandwidth based upon measurable characteristics of at least the pair of non-compressible packets.

Claims 13 and 43 recite:

via a dynamic network, receiving a first non-compressible packet and a second non-compressible packet, the dynamic network being a communications network having no assurance that both packets of a pair of identical packets are handled in an identical manner while in transit on the communications network;

calculating bandwidth based upon the relative timing of the receiving of the first and second non-compressible packets.

Claim 19 recites:

Lee & Hayes PLLC, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

via a dynamic network, sending at least a pair of non-compressible packets, the dynamic network being a communications network having no assurance that both packets of a pair of identical packets are handled in an identical manner while in transit on the communications network;

receiving a bandwidth calculation based upon measurements related to at least the pair of non-compressible packets.

Claims 30 and 44 recite:

via a dynamic network, sending a first non-compressible packet, the dynamic network being a communications network having no assurance that both packets of a pair of identical packets are handled in an identical manner while in transit on the communications network;

via the dynamic network, sending a second non-compressible packet immediately after the sending of the first packet.

Claim 46 recites:

a first packet containing non-compressible data;

a second packet following the first packet, the second packet containing non-compressible data,

wherein a dynamic communications channel being a communications network having no assurance that both packets of a pair of identical packets are handled in an identical manner while in transit on the communications network.

Claim 51 recites:

a processor;

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a network interface configured to be linked to a dynamic network, the dynamic network being a communications network having no assurance that both packets of a pair of identical packets are handled in an identical manner while in transit on the communications network;

a bandwidth measurer executable on the processor to:

receive a first non-compressible packet via the network interface linked to a dynamic network, the first non-compressible packet having measurable characteristics;

receive a second non-compressible packet via the network interface linked to a dynamic network, the second non-compressible packet having measurable characteristics;

calculate bandwidth based upon measurable characteristics of the first and second non-compressible packets.

Claim 52 recites:

a processor;

a network interface configured to be linked to a dynamic network, the dynamic network being a communications network having no assurance that both packets of a pair of identical packets are handled in an identical manner while in transit on the communications network;

a bandwidth measurer executable on the processor to:

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421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

send a first non-compressible via the network interface linked to a dynamic network;

via the network interface linked to the dynamic network, send a second non-compressible packet immediately after the first packet is sent.

In the Action, the Office acknowledges (p. 4, lines 7-8) that "Lai does not disclose the packets being non-compressible." The Office indicates (p. 4, lines 8-9) that "Bharali teaches a network system that utilizes non-compressible packets when sending messages." Based on this, the Office concludes that it would have been obvious to "include non-compressible packets as taught by Bharali in the invention disclosed by Lai because use of compressible may lead to unpredictable results as taught by Bharali."

The Office does not explain how or why one of ordinary skill would be motivated to combine the relevant teachings of **Lai** and **Bharali**. More specifically, the Office does not cite any specific objective evidence in the cited references that would motivate one of ordinary skill to combine the relevant teachings of the references to produce the recited features and elements of these claims.

While a technical dictionary may disclose every particular structural feature recited in a claim, Applicant submits that a proper obviousness rejection must still show sufficient objective evidence as to a teaching, suggestion, or motivation to combine such structural features – not solely as individual elements – but as recited in the claims.

Lee & Hayes plic, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

Applicant respectfully submits that the Office has not presented objective and specific evidence sufficient to support a motivation to combine the relevant teachings of **Lai** and **Bharali.**

Accordingly, Applicant asks that the Office withdraw its rejection of these claims.

Claims 2-12 and 53

These claims ultimately depend upon independent claim 1. As discussed above, claim 1 is allowable.

In addition to its own merits, each of these dependent claims is allowable for the same reasons that its base claim is allowable. Applicant submits that the Office withdraw the rejection of each of these dependent claims because its base claim is allowable.

Claims 14-18 and 54

These claims ultimately depend upon independent claim 13. As discussed above, claim 13 is allowable.

In addition to its own merits, each of these dependent claims is allowable for the same reasons that its base claim is allowable. Applicant submits that the Office withdraw the rejection of each of these dependent claims because its base claim is allowable.

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421 West Riverside, Suite 500, Spokane, WA 99201
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Claims 20—29 and 55

These claims ultimately depend upon independent claim 19. As discussed above, claim 19 is allowable.

In addition to its own merits, each of these dependent claims is allowable for the same reasons that its base claim is allowable. Applicant submits that the Office withdraw the rejection of each of these dependent claims because its base claim is allowable.

Claims 31-36 and 56

These claims ultimately depend upon independent claim 30. As discussed above, claim 30 is allowable.

In addition to its own merits, each of these dependent claims is allowable for the same reasons that its base claim is allowable. Applicant submits that the Office withdraw the rejection of each of these dependent claims because its base claim is allowable.

Claims 47-50

These claims ultimately depend upon independent claim 46. As discussed above, claim 46 is allowable.

In addition to its own merits, each of these dependent claims is allowable for the same reasons that its base claim is allowable. Applicant submits that the Office withdraw the rejection of each of these dependent claims because its base claim is allowable.

Lee & Hayes plic, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

Based upon Lai and Muuss

The Office rejects claims 37, 38, 41, 42, and 45 under USC § 103(a) as being unpatentable over **Lai** and **Muuss**. Applicant respectfully traverses the rejections of these claims. Based on the reasons given below, Applicant asks the Office to withdraw its rejection of these claims.

Claims 37, 42 and 45

The Office does not tie specific language of these claims to any specific cited portion of the reference. Instead, without linkage to any particular claim language, the Office discusses the cited references and cites portions of the references to support its discussion and conclusion. The portions cited by the Office include the following:

- **Lai**, section IV, B, pages 238-239;
- **Muuss**, page 1, lines 18-23 and lines 25-27.

Claims 37 and 45 recite:

> generating a list of entries, each entry containing a recent bandwidth measurement;
>
> each measurement being based upon a Packet-Pair bandwidth calculation of different pairs of packets, wherein a pair of packets differs from another pair of packets in objectively measurable characteristics.

Claim 42 recites:

> a list of entries, each entry being a recent bandwidth measurements;

Lee & Hayes pllc, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

each entry being based upon a Packet-Pair bandwidth calculation of different pairs of packets, wherein a pair of packets differs from another pair of packets in objectively measurable characteristics.

In the Action, the Office acknowledges that "**Lai** does not explicitly teach storing recent measurements into a list used for estimating the actual bandwidth." The Office indicates that "**Muuss** teaches a list of recent PINGS indicating the amount of time it took the ping to travel round-trip (bandwidth)."

Based on this, the Office concludes that it would have been obvious to "include a list of recent bandwidth measurements, as taught by **Muuss**, in the **Lai** invention because trends could ten be analyzed on the list of multiple measurements [] and would provide a more accurate measurement of the actual bandwidth than one measurement."

These claims recite "each measurement being based upon a Packet-Pair bandwidth calculation of *different* pairs of packets, wherein a pair of packets differs from another pair of packets in objectively measurable characteristics."

The Office has not identified where **Lai** or **Muuss** disclose each measurement in the list of entries is based upon a calculation for *different* pairs of packets. It appears that the PING utility re-sends the same packet over and over again. It does not send a different packet, which, for example, might be one of a different size, different entropic level, etc.

Accordingly, Applicant asks that the Office withdraw its rejection of these claims.

Lee & Hayes pllc, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

Claims 38-41

These claims ultimately depend upon independent claim 37. As discussed above, claim 37 is allowable.

In addition to its own merits, each of these dependent claims is allowable for the same reasons that its base claim is allowable. Applicant submits that the Office withdraw the rejection of each of these dependent claims because its base claim is allowable.

Lee & Hayes plic, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com

Dependent Claims

In addition to its own merits, each dependent claim is allowable for the same reasons that its base claim is allowable. Applicant submits that the Office withdraw the rejection of each dependent claim where its base claim is allowable.

Conclusion

All pending claims are in condition for allowance. Applicant respectfully requests reconsideration and prompt issuance of the application. If any issues remain that prevent issuance of this application, the Office is urged to contact the undersigned attorney before issuing a subsequent Action.

Respectfully Submitted,

Dated: 10-7-04

By: _____

Kasey C. Christie
Reg. No. 40559
(509) 324-9256 x232
kasey@leehayes.com
www.leehayes.com

Lee & Hayes plic, Intellectual Property Law
421 West Riverside, Suite 500, Spokane, WA 99201
509.324-9256 voice | 509.323-8979 fax | www.leehayes.com